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STUDIES ON THE GRAVID GENITALIA OF PREGNANT RED SOKOTO DOES IN SOUTHERN GUINEA SAVANNAH ECOLOGICAL ZONE OF NIGERIA

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ABSTRACT
The study was carried out at the main abattoir Makurdi, Benue State, Nigeria. A total of 49 samples of gravid genitalia of Red Sokoto (RS) does were obtained from the abattoir to investigate foetal developmental changes at different stages (early, mid and late) of gestation. The results showed that parameters such as weights of uterus, oviduct, allantoic and amniotic fluid volume were significantly ($P < 0.05$) different with respect to the three stages of gestation investigated. Number of corpora lutea, weight of ovary, number of fetuses and embryonic/foetal death did not differ significantly in all the stages of gestation. Foetal dimensions with respect to total length, crown rump length, curved crown rump length, vertebral column length and vertebral column and tail length were all significantly ($P < 0.05$) different at all the stages of pregnancy. However, the results also revealed that the incidence of single foetus was highest (50.0%) during late followed by mid gestation. The incidences of twin, triplet and quadruplet foetuses were highest during the mid-gestation period as compared to the other two gestation stages (early and late) studied. This study concludes that the RS does exhibited differential growth of the conceptus at different stages of pregnancy. There was sharp increase in foetal fluid (allantoic and amniotic) volume and foetal dimensions as gestation advances. The high percentages of twin, triplet and quadruplet foetuses proved the high fecundity of the goat breed in the study area.

KEYWORDS: Goat, genitalia, foetal dimensions, fluid volume

INTRODUCTION

In Nigeria, the common slaughtered livestock species for meat are cattle, goats, sheep, pig, camel and others such as donkeys, horses, dogs, rabbits, games and forest animals that are edible (Alabi, 1993). A report shows that there is a decrease in annual growth rate of livestock population in the country (CBN, 1997), and there was also a decline in the percentage contribution of the livestock sector to the gross domestic product (GDP) between 1991 and 1995. In an attempt to meet the protein need of the populace in the country, livestock are indiscriminately slaughtered to achieve this aim, but resulted in slaughtering of not only active breeding males but also pregnant animals in their prime of life. A very high percentage of foetuses are wastage daily in virtually all the abattoirs nationwide. Abdullahi (1985) reported that the slaughter of these pregnant animals in our abattoirs will no doubt aggravate the already precarious supply of animal protein to the ever-increasing human population of the country. This practice if not checkmate will no doubt have a far-reaching implication on income of the livestock producers. Sanusi *et al.* (2006) reported that it may impede the current policies of the nation on food security. Ndi *et al.* (1995) suggested that the slaughter of pregnant animals will contribute important cause of pre-natal losses in the country, and hence poses uncertainty with regard to the country's ability to meet its long term demands for quality meat and its products at an affordable price.

The Red Sokoto goats are the predominate and most widely spread breed of goats in the country. They are medium-sized animals and produce one of the most qualitative goat skins in Africa. The reproductive performance of these goats has been extensively studied by Butswat (1994) and Zahraddeen (2006). Information on gonadal sperm reserves of the yearlings of this breed has also been reported in literature (Butswat and Zahraddeen, 1998), but there is paucity of information on the developmental changes taking place in the genitalia of the pregnant Red Sokoto does at different stages of gestation. However, this study was designed to investigate the sequence of events in the gravid genitalia of Red Sokoto does with the hope of providing baseline data for use in other goat breeds in the study area and elsewhere.

MATERIALS AND METHODS

Study area

This study was carried out between Makurdi Main Abattoir and Animal Production laboratory at the University of Agriculture, Makurdi, Nigeria (March to May). The location and climate of the study area have been reported by Kowal and Knabe (1972). The State is located in Central Nigeria and is also part of the southern guinea savannah ecological zone of Nigeria. The society is mainly agrarian and the climate is suitable for agricultural activities. The State has an estimated human population of slightly more than 5.0 million people, using the annual growth rate of 3 per cent (NPC, 2006).

Experimental goats

The goat breed used in the study was the Red Sokoto does. These goats are the most widely distributed and predominate breeds in the country. The detailed descriptions of this breed have been reported by Osinowo (1990). However, the pregnant does taken to abattoir for slaughter was the specific target in the study.

Data collection

A large number of small ruminants, especially goats are slaughtered daily at the Makurdi Main Abattoir, Nigeria. The uteri of pregnant Red Sokoto does were collected from the slaughter slabs. This was carried out on a daily routine for a period of two (2) weeks. On slaughter of these animals, examination of foetal wastage was immediately carried out where the incidence was found, the uterus was carefully removed from the rest of other organs, and stored in a clean polythene bag and quickly transported to a laboratory at the University for further Investigations. At the laboratory, the samples were carefully trimmed and free from adhering connective tissues and fat coverage. Each sample was carefully dissected to get the foetus/foetuses. All samples collected were quickly observed and measurements taken were as follows:-

Organ weights: The genitalia was carefully dissected to separate the uterus, ovary and oviduct. The weights of each of these organs were weighed using a small portable but sensitive scale. The number of corpora lutea was carefully examined and counted from each pregnant does.

Foetal measurements: Each foetus was weighed after being carefully freed of the membranes of the cotyledons and placenta. Each foetus was weighed lying on its side in a near as natural position as possible i.e. describing a slight curve. Where there was no any sign of life or movement of the foetus at the time of collection from the abattoir, the foetus was then regarded as being dead. The number of dead and live foetuses was immediately recorded.

Other measurements taken on the foetus such as total length, crown rump length, curved crown rump length, vertebral column length and vertebral column and tail length were measured as per the procedures laid down by Harvey (1959). After careful removal of the membranes surrounding the foetus, the amniotic and allantoic fluids were also measured separately using a measuring cylinder and the volumes so obtained were recorded.

The foetal age was also estimated based on the developmental of certain features and organs referred to as developmental horizons, as per the method described by Cloette (1939). All measurements taken were classified based on the stage of gestation of the pregnant doe. Based on this study, the stage of gestation was divided into three viz early, mid and late gestations, as similarly described by Bitto (2001).

Data analysis

The data obtained from this study were subjected to analysis of variance. Other measurements were analyzed using simple descriptive statistics (means and percentages) using stage of gestation as factor, as per the descriptions of Parker (1979).

RESULTS

Data on some reproductive organs of Red Sokoto does` genitalia as influenced by stages of gestation are presented in Table 1. The results showed that weights of uterus and oviduct differed significantly ($P < 0.05$) with changes in gestation stages; while the weight of ovary remains unchanged throughout the gestation period. The number of corpora lutea and foetuses observed in the pregnant does were however did not alter during the pregnancy. Embryonic/foetal

death was not significantly different in the three stages of gestation. However, the volume of allantoic and amniotic fluids showed significant ($P < 0.05$) increase with the advancement in gestation period as shown in Table 1.

Table 2 shows data on foetal dimensions and ages at different stages of gestation in Red Sokoto does. The foetal dimensions such as total length, crown rump length, curved crown rump length, vertebral column length and tail length as well as foetal weights were all significantly ($P < 0.05$) influenced by the stage of pregnancy in the animal studied. The estimated foetal age (days) showed that early, mid and late gestations had average of 24.36 ± 2.04, 45.89 ± 2.79 and 120.12 ± 4.67 days, respectively.

Data on incidence of singlet, twin, triplet and quadruplet foetuses observed at the different stages of gestation are depicted in Table 3. The results showed that the incidence of single foetus was recorded highest during the late followed by mid-gestation. Twin foetuses were highest (55.56%) in the mid gestation followed by the late (27.77%) and lowest in the early pregnancy of the does. About 50.00 and 100.0% of triplets and quadruplet (respectively) were noticed during the mid gestation as compared to lowered number obtained in the other two stages of gestation (early and late) as shown in Table 3.

DISCUSSION

The genetic potentials of Red Sokoto does in reproduction will be well reflected by the developmental changes of their genitalia during gestation. There was extensive development of the genitalia as the animal advanced in pregnancy. The developmental changes occurred as a result of the prenatal growth of the foetus as pregnancy advanced. This was similarly reported by Sivachelvan *et al.* (2002) in their studies with Sahel goats of Nigeria. The higher values of oviductal weight observed in the early gestation as compared to other stages may be attributed to higher reproductive activities that occurred during that period. It is expected that shortly after fertilization the zygote descends to the uterus for its implantation. During the descent there is slight contraction of the walls of the oviduct as a result of muscular contractions and ciliary beatings occurring within the organ, which might have probably attributed for the increased oviductal weight in the early gestation as compared to other periods. This was similarly reported by Ceoffrey *et al.* (1989). These might have been the reasons for the higher weight of the oviduct at the early stages of gestation.

The non-significant differences in the weight of ovary in the does with advancement in pregnancy might have been linked to similar number of corpora lutea at the various stages of gestation. The number of foetuses/embryonic (foetal deaths occurred uniformly in all the three stages of gestation as investigated in the present study. Allan and Stamp (1987) reported the number of ova and fetuses which die during pregnancy and the birth process. The causes of embryonic death early in pregnancy are not well understood, but in general dams in good body condition at mating have lower rate of embryonic mortality than dams in poor condition, and they also have decreased incidence of reproductive problems (Zahraddeen *et al*., 2007). The volumes of allantoic and amniotic fluids significantly from early up to late gestation in the goat breed. This was in conformity with the findings of Cloette (1939) who reported that the total volume of foetal fluid increases with advancing age of the ewe conceptus but that the separate foetal fluid volumes show different tendencies. Arthur *et al.* (1989) also reported that during the last month of pregnancy in sheep the allantoic fluid almost doubles its volume but the volume of amniotic fluid diminishes. This worker further reported that when twins are present in the sheep uterus the totals of fluid are approximately doubled. However, the pattern of foetal fluid (allantoic and amniotic) formation in the Red Sokoto does is comparable to the findings obtained in ewes as reported by Arthur *et al.* (1989).

Foetal dimensions of Red Sokoto does at different ages of growth revealed similar trend to Sahelian goats in Maduguri as reported by Sivachelvan *et al.* (2002). The visible features of the foetuses in the present study could be tremendous benefits in the estimation of age of the foetus at particular point in time during the pregnancy as reported in other animals elsewhere by Osuagwuh and Aire (1986).

Per cent incidence of foetuses in the doe uterus showed that higher percentage (50.0%) of single foetus was recovered in does during mid-gestation than in other stages. There were more twins, triplets and quadruplets in the doe`s uterus during the mid-gestation as compared to early and late pregnancy. In a comparative study of multiple births in West African Dwarf ewes and does showed similar trend to the present investigation using Red Sokoto does (Zahraddeen *et*

al., 2008). The goat is a prolific breeder especially under tropical conditions as reported by Davendra and Maleroy (1988).

CONCLUSIONS

This study on the gravid genitalia of pregnant Red Sokoto does revealed differential growth of the conceptus at different stages of pregnancy, with more extensive growth during the late gestation. There was sharp increase in foetal fluid (allantoic and amniotic) volumes as gestation advances. The foetal dimensions showed tremendous increase from early to late pregnancy with visible features on the foetuses for easy estimation of the animal age. The high percentages of triplets and quadruplets in the does uterus proved the breed high fecundity.

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Table 1: Mean (±SE) values of some reproductive organs of Red Sokoto does at different stages of gestation

Parameters/ stage of gestation	Weight of uterus (g)	Weight of ovary (g)	Weight of oviduct (g)	No. of corpora lutea	No. of fetuses	Embryonoic death (%)	Allantoic fluid vol. (ml)	Amniotic fluid vol. (ml)
Early	225.51 ± 48.80^{c}	1.48 ± 0.15^{a}	0.57 ± 0.16^{a}	2.33 ± 0.30^{a}	1.71 ± 0.28^{a}	19.44 ± 8.26^{a}	23.93 ± 9.26^{c}	17.92 ± 4.63^{c}
Mid	789.25 ± 135.97^{b}	1.56 ± 0.16^{a}	0.44 ± 0.03^{b}	2.80 ± 0.27^{a}	1.70 ± 0.17^{a}	25.75 ± 6.43^{a}	117.81 ± 24.52^{b}	115.29 ± 17.82^{b}
Late	2084.37 ± 245.27^{a}	1.29 ± 0.15^{a}	0.34 ± 0.04^{c}	2.40 ± 0.25^{a}	1.37 ± 0.13^{a}	32.50 ± 9.01^{a}	205.62 ± 31.40^{a}	189.11 ± 20.87^{a}

a, b, c Means in the same column having different superscripts differed significantly at 5%

Table 2: Feotal dimensions at different stages of gestation in Red Sokoto does

Parameters/ stage of gestation	TL (cm)	CR (cm)	CVR (cm)	VR (cm)	VRT (cm)	Weight (g) of foetus	Estimated foetal age (days)
Early	6.44 ± 0.58^{c}	4.00 ± 0.5^{c}	4.90 ± 0.51^{c}	3.92 ± 0.39^{c}	4.23 ± 0.42^{c}	2.81± 0.73^{c}	24.36 ± 2.04^{c}
Mid	12.94 ± 0.78^{b}	8.20 ± 0.52^{b}	9.28 ± 0.57^{b}	7.90 ± 0.46^{b}	8.90 ± 0.53^{b}	29.89 ± 4.66^{b}	45.89 ± 2.79^{b}
Late	36.18 ± 2.25^{a}	24.29 ± 1.35^{a}	27.69 ± 7.68^{a}	22.93 ± 1.39^{a}	27.05 ± 1.79^{a}	683.70 ± 116.08^{a}	120.12 ± 4.67^{a}

TL = Total length, CR = Crown-rump length, CVR = Curved crown rump length, VR = Vertebral column length,VRT = Vertebral column and tail length,
a, b, c Means in the same column having similar superscripts are not significantly different at 5 %

Table 3: Incidence of single, twin, triplet and quadruplet foetuses with stage of gestation in Red Sokoto does

Stage of gestation	Number of fetuses				Per cent incidence			
	Single	Twin	Triplet	quadruplet	Single	Twin	Triplet	quadruplet
Early	3	3	1	0	11.54	16.67	25.00	0.00
Mid	10	10	2	1	38.46	55.56	50.00	100.00
Late	13	5	1	0	50.00	27.77	25.00	0.00
Total	26	18	4	1	100.00	100.00	100.00	100.00